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Ferroelectricity Newsletter

A quarterly update on what's happening in the field of ferroelectricity

Volume 12, Number 1

Winter 2004

IN THE LIMELIGHT:

APPLICATIONS OF POLAR DIELECTRICS

In this issue we will focus on what's happening in the field of polar dielectrics. In 1988 Professor Peter Günter (ETHZ, Switzerland) initiated a series of conferences dealing with applications of polar dielectrics. The first European Conference on Applications of Polar Dielectrics (ECAPD) was held in Zürich (Switzerland), followed four years later by ECAPD-II in London, and in 1996 by ECAPD-III in Bled (Slovenia). The next three conferences were held every two years, 1998 in Montreux (Switzerland), 2000 in Riga (Latvia), and ECAPD-VI in Aveiro (Portugal) in 2002, reflecting the growing interest in this field in recent years.

You will find the titles and authors of the presentations delivered at **ECAPD-VI** on pages 8-12 of this issue. According to the guest editors of the proceedings, published in Volumes 293 - 296 (2003) of the international journal **FERROELECTRICS**, ECAPD-VI attracted close to 130 participants from 22 different countries representing Europe, the United States, Asia, and Latin America. Plenary lectures were given by leading researchers in the field: Prof. N. Setter (EPFL, Switzerland), Prof. Peter Günter (ETHZ, Switzerland), Prof. J. Scott (Cambridge University, UK), Prof. A. Safari (Rutgers University, USA), Prof. J. Fousek (University of Liberec, Czech Republic), Dr. Vakhrushev (Ioffe Institute, Russia), and Prof. Bell (University of Leeds, UK).

The **7th European Conference on Applications of Polar Dielectrics (ECAPD7)** will take place in Liberec (Czech Republic) on 6 - 9 September 2004. For details, please see pages 14 and 15.

Titles and authors of the **Seventh Russian-CIS-Baltic-Japanese Symposium on Ferroelectricity (RCBJSF-7)** presentations are listed on pages 2-7.

In addition to **ECAPD-VI**, the section **UPCOMING MEETINGS** features the **UK Ferroelectric Materials Network Conference** at Cranfield University and six short courses offered by the **American Chemical Society** (p.13).

As usual, the **Calendar of Events** on the back cover of our newsletter provides important information at a glance.

Rudolf Panholzer
Editor-in-Chief

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RCBJSF-7 PAPERS

THE SEVENTH RUSSIAN-CIS-BALTIC-JAPANESE SYMPOSIUM ON FERROELECTRICITY (RCBJSF-7)

The Seventh Russian-CIS-Baltic-Japanese Symposium on Ferroelectricity was held in St. Petersburg, Russia, on 24-28 June 2002. Volumes 283, 284, 285, and 286 (2003) of the *FERROELECTRICS* journal, guest edited by **V.V. Lemanov, S.B. Vakhrushev, Y. Uesu, and A. Onodera**, contain papers presented at this symposium.

As noted in the guest editorial, RCBJSF-7 follows a series of symposia on ferroelectricity alternatively held in Russia and Japan since 1976. The first symposium, jointly initiated by Nobel Prize winner Professor A. Prokhorov and Professor J. Kobayashi, was held in Novosibirsk. That and the following symposia (Kyoto-1980, Novosibirsk-1984, Tsukuba-1988, Moscow-1994, and Noda-1998) established scientific cooperation between Japanese, Russian, CIS and Baltic scientists.

Altogether 178 scientists from Russia (99), other CIS countries and Baltic republics (11) including Ukraine, Belorussia, Azerbaijan, Uzbekistan, Estonia, Latvia, Lithuania, and from Japan (54) took part in the Symposium. According to the agreement between the Russian and Japanese sides, 14 scientists from Western Europe (Germany, the United Kingdom, Spain, Portugal, Switzerland, the Netherlands), as well as from Turkey and from the USA also participated in the Symposium, at which 69 plenary lectures and 142 poster reports were presented. Of the presentations, 110 papers have been included in the RCBJSF-7 proceedings.

Subjects covered at the Symposium included advances in theory, phase transitions and critical phenomena, incipient ferroelectrics, relaxors, dielectric and piezoelectric properties, and thin films.

About 10 papers, both theoretical and experimental, deal with results of studies by several research groups of recently discovered oxygen-isotope effects in SrTiO_3 . The isotope effects can be considered as a touchstone of our understanding of the microscopic nature of ferroelectricity in perovskites.

The editorial goes on to state: "A large number of papers are devoted to phase transitions in perovskite and perovskite-like crystals, hydrogen-bonded and organic materials, to studies of LiNbO_3 crystals and mixed valence systems.

Relaxors continue to attract attention of researchers (mainly from Russia). In these proceedings, 14 papers (theory and experiment) are presented on studies of the relaxors.

A considerable part of the Proceedings is devoted to ferroelectric thin films (18 papers), i.e., to integrated ferroelectrics with their promising practical applications."

The next Russian-CIS-Baltic-Japanese Symposium on Ferroelectricity (RCBJSF-8) will be held in Tsukuba, Japan, in 2006.

The following is a list of the authors and titles of the presentations published in the Proceedings.

THEORY

Zero- T transitions in order-disorder systems: Displacive-like behavior.

A. Cano and A.P. Levanyuk

Isotope effect on the ferroelectric phase transitions in BaTiO_3 , SrTiO_3 and PbTiO_3

Takehiko Hidaka

Dependence of the dielectric constant on electric field in $\text{SrTi}(\text{}^{16}\text{O}_{1-x}\text{}^{18}\text{O}_x)_3$ at oxygen substitution

P. Konsin and B. Sorkin

RCBJSF-7 PAPERS

Ferroelectricity of perovskite (ABO₃) type crystals

Wataru Kinase and Koji Harada

Lattice dynamics calculations of the ionic crystals with ion dipole and quadrupole deformations:

Perovskite structure oxides

N.G. Zamkova, V.I. Zinenko, O.V. Ivanov, E.G. Maksimov, and S.N. Sofronova

Cluster *ab initio* calculations of the shape of local potentials well and of positions for oxygen atoms in PCN (C=CD)

F. Karadag, S. Palaz, S. Güngör, A. Mamedov, and O.E. Kvyatkovskii

Thermodynamics of antiferroelectric phase transition in PbZrO₃

H. Fujishita and Y. Ishikawa

Light scattering in relaxor ferroelectrics due to domain structure

Amirullah M. Mamedov, Yunus Babur, and Gülten Gunel

Localized charges and model of relaxor ferroelectrics

R.F. Mamin, S.A. Migachev, M.F. Sadykov, and D.G. Zverev

Theoretical approach to constructing temperature-pressure phase diagrams for TMA-family crystals

H. Mashiyama, G.A. Kessenikh, and D.G. Sannikov

Pseudospin Hamiltonian parameters from quantum chemical treatment: K₃H(SO₄)₂ (TKHS) family

S.P. Dolin, A.A. Levin, T. Yu. Mikhailova, N.S. Strokach, and N.I. Kirillova

Many-field theory for crystals

containing particles with rotational degrees of freedom

Sergey V. Dmitriev, Aleksey A. Vasiliev, Andrey A. Miroshnichenko, Takeshi Shigenari, Yukata Kagawa, and Yoshihiro Ishibashi

Stable modulated and homogeneous structures of quartz (SiO₂): Analysis of eigen-modes near phase transition points

Denis A. Semagin, Sergey V. Dmitriev, Kohji Abe, and Takeshi Shinegari

Model of copper centres in KTaO₃: Charge transfer, charge compensation, and propagation of superhyperfine field

V.S. Vikhnin, A.G. Badalyan, and P.G. Baranov

Vibronic effects in cuprate superconductors with a two-component spectrum created by doping

N. Kristoffel and P. Rubin

PHASE TRANSITIONS

Phase transitions dynamics studied by coherent phonon excitation with ultrashort laser pulses

Toshirou Yagi, Jun Kano, Tateo Watanuki, Yuhji Tsujimi, and Keith A. Nelson

Scanning near-field Raman microscopy on ferroelectrics

Akira Sakai, Naoto Sasaki, Tomoyuki Tamati, and Takanori Ninomiya

Far-infrared ferroelectric soft phonon-polariton probed by THz time domain spectroscopy

S. Kojima, N. Tsumura, H. Kitahara, M. Wada Takeda, and S. Nishizawa

Pressure-induced phase transformations in ScF₃ crystal-Raman spectra and lattice dynamics

K.S. Aleksandrov, V.N. Voronov, A.N. Vtyurin, S.A. Goryainov, N.G. Zamkova, V.I. Zinenko, and A.S. Krylov

Raman spectra and phase transitions in the Rb₂KScF₆ elpasolite

A.S. Krylov, A.N. Vtyurin, A. Bulou, and V.N. Voronov

Ferroelectric phase transition and new intermediate phase in Bi-layered perovskite SrBi₂Ta₂O₉

K. Yoshio, A. Onodera, and H. Yamashita

Amplitude-dependent internal friction in SrTi₃ in a vicinity of the ferroelastic phase transition

S.A. Gridnev and E.V. Ukhin

Novel feature of the phase transitions in BaTiO₃T revealed by "mK-stabilized cell"

Akira Kojima, Yasuhiro Kawakatsu, Hiroshi Sasou, Yukio Yoshimura, Hiroshi Iwasaki, and Ken-Ichi Tozaki

Ferroelectric phase transition in CdTiO₃ single crystal

Yue Jin Shan, Hajime Mori, Keitaro Tezuka, Hideo Imoto, and Mitsuru Itoh

Heat flow and X-ray diffraction study on the phase transitions in CsPbCl₃

Akira Kojima, Yu Nishibori, Yohei Maeda, Noriyuki Inoue,

RCBJSF-7 PAPERS

Yukio Yoshimura, Naotoshi Tokunaga, Hiroshi Iwasaki, and Ken-Ichi Tozaki

MPB phase diagram and ferroelectric properties in the PbTiO_3 - BiScO_3 system
Y. Shimojo, R. Wang, T. Sekiya, T. Nakamura, and L.E. Cross

Structural phase transition of CsNO_3 crystal—Spontaneous polarization
Y. Takagi, S. Kimura, and Y. Takeuchi

Linear and volume expansions of ferroelectric NaNO_2
Toshihisa Yamaguchi and Kazutaka Atoke

Splitting of the XPS in ferroelectric SbSI crystals
Jonas Grigas, Ewa Talik, and Valentinas Lazauskas

Phonon spectra and phase transitions in $\text{CuInP}_2(\text{Se}_x\text{S}_{1-x})_6$ ferroelectrics
Yu. Vysochanskii, R. Yevych, L. Beley, V. Stephanovich, V. Mytrovcij, O. Mykajlo, A. Molnar, and M. Gurzan

Temperature dependent EXAFS study of the local structure of $\text{Fe}_3\text{B}_7\text{O}_{13}\text{Br}$
T.I. Nedoseykina, V.A. Shuvaeva, I.V. Pirog, A.T. Shuvaev, K. Yagi, Y. Azuma, and H. Terauchi

Charge-density study of the high temperature orthorhombic phase in ferroelastic CsLiCrO_4
Akikatsu Sawada, Nobufumi Sato, Shinobu Aoyagi, Isao Hashiguchi, and Yoshihiro

Kuroiwa

Alteration of non-linear optical coefficients of ferroelectric under the light action
E.V. Bursian and A.I. Zaitsev

ISOTOPE EFFECTS

Dielectric properties of $\text{SrTi}^{18}\text{O}_3$
Mitsuri Itoh, Ruiping Wang, Miho Narahara, and Toru Kyomen

SHG microscopic studies on low temperature phase transitions of $\text{SrTi}^{16}\text{O}_3$ and $\text{SrTi}^{18}\text{O}_3$
Yoshiaki Uesu, Ryuhei Nakai, Noritaka Kato, Carole Menoret, Jean-Michel Kiat, Mitsuru Itoh, Miho Narahashi, and Toru Kyomen

Light scattering studies in ferroelectric $\text{SrTi}^{18}\text{O}_3$
Hiroki Hasebe, Yuhji Tsujimi, Ruiping Wang, Mitsuru Itoh, and Toshiro Yagi

Impulsive stimulated Raman scattering of $\text{SrTi}^{(18}\text{O}_x^{16}\text{O}_{1-x})_3$
T. Watanuki, Y. Tsujimi, R.P. Wang, M. Itoh, and T. Yagi

Raman spectra of ferroelectric soft mode in SrTiO_3 : Effect of electric field
Takeshi Shigenari, Kohji Abe, Keiji Yamashita, Tomohiko Takemoto, Ruiping Wang, and Mitsuri Itoh

Effects of isotopic substitution in SrTiO_3 studied by Brillouin scattering
M. Yamaguchi, T. Yagi, R. Wang, and M. Itoh

HYDROGEN-BONDED FERROELECTRICS

The extremely early stage of the ferroelectric B_2 soft mode of KDP studied by the impulsive stimulated Raman scattering
Jun Kano, Yuhji Tsujimi, Keith A. Nelson, and Toshiro Yagi

Dielectric relaxation in mixed ferro-glassy state in solid solutions of $\text{K}_{1-x}(\text{NH}_4)_x\text{H}_2\text{PO}_4$ type
L.N. Korotkov and L.A. Shuvalov

Spontaneous strain of monoclinic RbD_2PO_4 in the intermediate phase
Chikado Moriyoshi, Tsutomu Fujii, and Kazuyukiitoh

Phase transitions in CsH_2PO_4 under high pressure
Yuki Kobayashi, Kiyoshi Deguchi, Shinji Azuma, Eisuke Suzuki, Li Chung Ming, Shoichi Endo, and Takumi Kikegawa

Structural study of phase transition in ferroelectric RbHSO_4
Kazuyuki Itoh and Chikako Moriyoshi

^1H and ^{205}Tl spin-lattice relaxation at low temperatures in $\text{Tl}_3\text{H}(\text{SO}_4)_2$
Yasumitsu Matsuo, Yuya Shimizu, Shinya Kawachi, and Seiichiro Ikehata

NMR study of TiHSO_4
Yukihiko Yoshida, Yasumitsu Matsuo, and Seiichiro Ikehata

Dynaamical properties of the partially disordered crystals of $\text{Cs}_5\text{H}_3(\text{SO}_4)_4 \cdot x\text{H}_2\text{O}$
A.I. Fedoseev, S.G. Lushnikov, S.N. Gvasaliya, J.-H. Ko, S. Kojima, and L.A. Shuvalov

RCBJSF-7 PAPERS

Phase transition in
 $K_2Fe(SO_4)_2 \cdot 4H_2O$

*H. Ishigami, M. Sumita, M.
Shiro, T. Hikita, S.Sato, and M.
Tanimoto*

Effect of hydrostatic pressure on the
phase transitions in
 $[N(C_2H_5)_4]_2CuCl_4$

Kazuo Gesi

X-ray and neutron studies of
antiferroelectric phase transition in
 $Cu(HCOO)_2 \cdot 4H_2O$

*T. Omura, K. Yoshizumi, C.
Moriyoshi, K. Itoh, and S. Ikeda*

Ultrasonic investigations of
 $[(CH_3)_2NH_2]_2 \cdot CuCl_4$ crystal

*A.U. Sheleg and A.JA.
Yachkouski*

Pressure-induced structural transi-
tion in TGS

*Eisuke Suzuki, Yuki Kobayashi,
Shoichi Endo, Kiyoshi Deguchi,
and Takumi Kikegawa*

Selective effect of weak magnetic
field on triglycine sulfate crystal

*M.N. Levin, V.V. Postnikov, and
M.Y. Palagin*

Dielectric and acoustic properties of
some betaine and glycine com-
pounds

*E.V. Balashova and V.V.
Lemanov*

Protein amino acid crystals: Struc-
ture, symmetry, physical properties

*V.V. Lemanov, S.N. Popov, and
G.A. Pankova*

RELAXORS

On the origin of dielectric response
in relaxors

*A.A. Volkov, A.I. Ritus, and A.V.
Khvalkovskii*

Relaxor-like dielectric relaxation:
Artifacts and intrinsic properties

A.I. Baranov

Vibrational spectra of complex
perovskites

*S.N. Gvasaliya, S.G. Lushnikov,
and I.L. Sashin*

Dielectric and relaxor properties of
the lead-containing ferroelectric
ceramics

*E.D. Politova, A.S. Abdulova,
G.M. Kaleva, and V.V.
Shvartsman*

The effect of technological factors
on the synthesis of
 $PbMg_{1/3}Nb_{2/3}O_3$

*M. Dambekalne, M. Antonova,
M. Kalnberga, A. Kalvane,
M.Livinsh, I. Brante, L.
Shebanovs, and K. Bormanis*

Structural, optical, and dielectric
investigations of the relaxor PLZT
9,75/65/35 ceramics irradiated by
high-current pulsed electron beam

*V.V. Efimov, V.V. Ivanov, A.V.
Kalmikov, E.A. Klevtsova, V.F.
Minashkin, N.N. Novikova, V.V.
Sikolenko, A.V. Skripnik, A.
Sternberg, S.I. Tiutiunnikov, and
V.A. Yakovlev*

Slow polarization kinetics in relaxor
ferroelectrics

*V.V. Gladkii, V.A. Kirikov, T.R.
Volk, and L.I. Ivleva*

Cation ordering and dielectric
properties of $PbMg_{1/3}Nb_{2/3}O_3$ -
 $PbSc_{1/2}Nb_{1/2}O_3$ solid solution
crystals

I.P. Raevski, S.M. Emelyanov,

*F.I. Savenko, I.N. Zakharchenko,
O.A. Bunina, M.A. Malitskaya,
A.S. Bogatin, and E.V. Sakhar*

Manifestation of polaronic states in
ferroelectric relaxor PMN

*V.S. Vikhnin, S.E. Kapphan, I.L.
Kislova, R.I. Eglitis, and P.A.
Markovin*

$LiNbO_3$: PHOTOVOLTAIC EFFECTS, DEFECT STRUC- TURE, DOMAINS

Elimination of photovoltaic induced
instabilities and the theoretical
evaluation of material parameters in
iron-doped lithium niobate using
contra-directional two-beam cou-
pling

*D.R. Evans, M.A. Saleh, A.S.
Allen, T.P. Pottenger, T.J.
Bunning, S. Guha, and S.A.
Basun*

Raman spectra and structural defects
of lithium niobate crystals

*N.V. Sidorov, M.N. Palatnikov,
K. Bormanis, and A. Sternberg*

Nonlinear interaction SAW with
periodic domain structures in
 $LiNbO_3$ crystals

*N. Batanova, A. Golenishchev-
Kutuzov, V. Golenishchev-
Kutuzov, and R. Kalimullin*

Development of method of determi-
nation of Li/Nb ratio in $LiNbO_3$
crystals

*V.V. Geraskin, A.A. Blistanov,
J.A. Goreeva, and J.V. Klyukhina*

Raman scattering evidence of fast
relaxation in $LiNbO_3$ crystals

*V.K. Malinovski, A.M. Pugachev,
A.P. Shebanin, and N.V.
Surovtsev*

RCBJSF-7 PAPERS

DIELECTRIC, PIEZOELECTRIC AND PYROELECTRIC PROPERTIES

Dielectric enhancement in quantum paraelectric SrTiO₃ by UV laser irradiation under DC electric field

Masaki Takesada, Mitsuri Itoh, Toshiro Yagi, and Shin-Ya Koshihara

Ferroelectric domain controlled Pb[(Zn_{1/3}Nb_{2/3})_{0.91}Ti_{0.09}]O₃ single crystal with giant electromechanical coupling factor of *k*₉₃₁ mode and piezoelectric *d*₃₁ constant

Toshio Ogawa and Yoshiki Numamoto

Non-Debye domain wall-induced dielectric response in SBN:Ce

W. Kleemann, J. Dec, and R. Pankrath

Search for new ferroelectrics in Tl₂ZnI₄ group

Fuminao Shimizu, Masaaki Takashige, Sin-Ichi Hamazaki, and Toshihisa Yamaguchi

Growth of substituted langasite-type Ca₃NbGa₃Si₂O₁₄ single crystals, and their dielectric, elastic and piezoelectric properties

Masatoshi Adachi, Takeo Funakawa, and Tomoaki Karaki

Electric properties of lithium tetraborate in vitreous and crystalline states

V.M. Rizak, I.M. Rizak, N.D. Baisa, V.S. Bilanych, S. Yu. Stefanovych, M.B. Bohuslavskii, and V.m. Holovey

Dielectric anomalies of (K_{0.5}Na_{0.5})_{0.2}(Sr_{0.75}Ba_{0.25})_{0.9}Nb₂O₆

single crystals with the tungsten bronze structure

Jae-Hyeon Ko, Do Han Kim, S.G. Lushnikov, R.S. Katiyar, and Seiji Kojima

Nonlinear behavior of barium titanate single crystals in strong electric fields

I.N. Leontiev, A. Leyderman, V. Yu, Topolov, and O.E. Fesenko

Structure and dielectric properties of Ba_{1-x}La_xTi_{1-x}Cr_xO₃ ceramics

Mamoru Fukunaga, Guobao Li, Yoshiaki Uesu, and Kay Kohn

Piezoelectric properties of bismuth layer-structured ferroelectric SrBi₂Ta₂O₉-Bi₃TiTaO₉ ceramics

Hajime Nagata, Masato Itagaki, and Tadashi Takenaka

Dielectric properties of spark-plasma-sintered (Na_{0.5}K_{0.5})NbO₃-PbTiO₃ ceramics

R. Wang, R. Xie, T. Sekiya, Y. Shimojo, Y. Akimune, N. Hirosaki, and M. Itoh

Dielectric relaxation in amorphous and amorphous-crystalline lead titanate

L.N. Korotkov, S.A. Gridnev, A. Khodorov, S.V. Kashirskii, S.A. Konstantinov, and T.I. Likhoshershtova

High pressure synthesis, lattice distortion, and dielectric properties of a perovskite Bi(Ni_{1/2}Ti_{1/2})O₃

Yoshiyuki Inaguma and Tetsuhiro Katsumata

Anomalous piezoelectric properties of ferroelectric semiconductor SbSBr

Takashi Inushima and Kunimitsu

Uchinokura

Dielectric losses in ferroelectrics at ultrahigh frequencies

E.N. Sidorenko, A.V. Turik, I.I. Natkhin, and I.S. Andreev

Dielectric properties and dipole glass transition in cellulose acetobacter xylum

A.I. Baranov, V.N. Anisimova, A.K. Khripunov, and Yu.G. Baklagina

MIXED VALENCE SYSTEMS

Dielectric and magnetic properties of a mixed valence oxide Fe₂BO₄

Nanayo Suda, Kay Kohn, and Shin Nakamura

Lattice distortion at ferroelectric transition of YMn₂O₅

I. Kagomiya, S. Matsumoto, K. Kohn, Y. Fukuda, T. Shoubu, H. Kimura, Y. Noda, and N. Ikeda

Structure transition and charge competition on YFe₂O₄

Naoshi Ikeda, Ryosuke Mori, Shigeo Mori, and Kay Kohn

Mössbauer spectrum and spin structure of weakly ferroelectric YMn₂O₅ and HoMn₂O₅

Satoshi Matsumoto, Midori Tanaka, Isao Kagomiya, Kay Kohn, and Shin Nakamura

FINITE SIZED SYSTEMS

Study of 2D phase transition of polar organic dye molecules at the air-water interface by using grazing-incidence X-ray diffraction

Noritaka Kato, Ichiro Hirosawa, Masugu Sato, Naoshi Ikeda, and

RCBJSF-7 PAPERS

Yoshiaki Uesu

Ferroelectrics templated in nanoporous silicon membranes

E.D. Mishina, N.E. Sherstyuk, V.I. Stadnuchyuk, K.A. Vorotilov, V.A. Vasil'ev, A.S. Sigov, O.M. Zhigalina, N. Ohta, and S. Nakabayashi

Structure of KD_2PO_4 embedded in porous glass

B. Dorner, I. Golosovsky, Yu. Kumzerov, D. Kurdukov, A. Naberezhnov, A. Sotnikov, and S. Vakhrushev

THIN FILMS

New developments in ferroelectric thin films

J.F. Scott, M. Dawber, A.Q. Jiang, and F.D. Morrison

Strongly modulated conductance in Ag/PLZT/LSCO ferroelectric field-effect transistor

I. Grekhov, L. Delimova, I. Liniichuk, D. Mashovets, and I. Veselovsky

Thermodynamical properties of the thin polycrystalline $BaTiO_3$ films on substrates

B.A. Strukov, S.T. Davitadze, S.A. Taraskin, B.M. Goltsman, S.G. Shulman, and V.V. Lemanov

Slow dielectric relaxation in $SrRuO_3/Ba_{0.8}Sr_{0.2}TiO_3/SrRuO_3$ ferroelectric thin film capacitor structures

V.V. Lemanov, B.M. Goltsman, V.K. Yarmarkin, and Yu.A. Boikov

Microstructure and dielectric properties of $(Ba_{0.7}Sr_{0.3})TiO_3$ thin

films

P.V. Burmistrova, A.S. Sigov, K.A. Vorotilov, D.N. Zakharov, and O.M. Zhigalina

Influence of Mg and Mn doping on the RF-microwave dielectric properties of $Ba_xSr_{1-x}TiO_3$ films

A.I. Dedyk, S.F. Karmanenko, A.A. Melkov, M.V. Pavlovskaya, V.I. Sakharov, and I.T. Serenkov

Optical second harmonic generation for determination the domain orientation in thin ferroelectric films

E.D. Mishina, N.E. Sherstyuk, A.V. Mishina, V.m. Mukhorotov, G. Buinutskaya, L.L. Kulyuk, and Th. Rasing

Investigation of switching behaviour in $PbZr_{0.55}Ti_{0.45}O_3$ thin films by means of scanning probe microscopy

V.V. Shvartsman and A.L. Kholkin

Polarization switching and dielectric properties of ferroelectric thin films

M. Maletto, E. Pevtsov, A. Sigov, and A. Svotina

Microstructure of PZT capacitor structures

O.M. Zhigalina, P.V. Burmistrova, A.L. Vasiliev, V.V. Roddatis, A.S. Sigov, and K.A. Vorotilov

CO_2 -laser induced structure changes in PZT sol-gel films

M. Knite, G. Mezinskis, L. Shebanovs, I. Pedaja, and A. Sternberg

Ceramics and thin films of some new $Pb(B^{3+}, Nb)TiO_3$ - $PbTiO_3$

systems

A. Sternberg, L. Shebanovs, V. Zauls, and K. Kundzins

Synthesis and study of dielectric properties of $PbTiO_3$ thin films

A.S. Sidorkin, L.P. Nesterenko, I.A. Bocharova, V.A. Sidorkin, and G.L. Smirnov

Tunable microwave resonators and filters based on ferroelectric multilayer transmission line

I.G. Mironenko, A.A. Ivanov, A.A. Semenov, S.S. Karmanenko, A.V. Gordeichuk, and T. Inushima

Ferroelectric thin film microwave examination

V. Kazmirenko, Y. Poplavko, L. Pereverzeva, Y. Prokopenko, Beomjin Kim, Minki Jeong, and Sunggi Baik

Microwave properties of thin $Ba_{0.3}Sr_{0.7}TiO_3$ films

S. Razumov, A. Tumarkin, M. Gaidukov, and A. Gagarin

Second harmonic generation of light in doped ferroelectric polymer films

K.A. Verkhovskaya and N.I. Kuznetsova

Ferroelectric switching of combined ultrathin Langmuir-Blodgett films

V.M. Fridkin, G. Vizdrik, and S.G. Yudin



ECAPD-VI PAPERS

THE SIXTH EUROPEAN CONFERENCE ON APPLICATIONS OF POLAR DIELECTRICS (ECAPD-VI)

Hosted by the Department of Ceramics and Glass Engineering of the University of Aveiro, the 6th European Conference on Applications of Polar Dielectrics (ECAPD) took place in Aveiro (Portugal) on 2-5 September 2002. The ECAPD-VI Proceedings, guest edited by **Victor Ferreira, Andrei Kholkin, Pedro Mantas, Paula Vilarinho, and Ana Senos**, are published in Volumes 293-296 of *Ferroelectrics*.

The list of the titles and authors of the ECAPD-VI presentations follows.

PLENARY AND INVITED PAPERS

Fabrication of electroceramic components by layered manufacturing (LM)

R.E. Brennan, S. Turcu, A. Hall, N.M. Hagh, and A. Safari

A two-parameter thermodynamic model for PZT

Andrew J. Bell and Eugene Furman

New ferroelectric thin-film results: Electrode effects and photonic crystals

J.S. Scott

Open issues in application aspects of domains in ferroic materials

J. Fousek and L.E. Cross

THIN FILMS

Processing and characterization of high quality thick PZT films

M. Es-Souni, A. Piorra, and C.-H. Solterbeck

Fabrication of PZT thin films by liquid delivery MOCVD with conventional multi-sources and a novel cocktail source

Tadashi Shiosaki, Soichiro Okamura, Masato Miyake, Yohei Otani, and Norikazu Abe

Temperature dependence of the

electrical and electromechanical properties of PZT thin films

Hiroshi Maiwa and Noboru Ichinose

Characterization of (Bi,La)₄Ti₃O₁₂ film formed on Pt electrode with (Cr,Ti)N/TiN/Ti barrier layers

Hiroshi Ohki and Hiroshi Ishiwara

High-temperature phases in PZT ferroelectric films

A. Deyneka, G. Suchanek, L. Jastrabik, and G. Gerlach

Evaluation of ferroelectric/silicon interface state density in ferroelectric-gate transistors using a charge pumping method

Koji Aizawa and Hiroshi Ishiwara

Conducting strontium ruthenium oxide interface layers for application to PZT/SrRuO₃/metal thin film capacitors

R. Seveno, A. Braud, and H.W. Gundel

Electric properties of PZTN (65/35/x) thin films deposited by sol-gel

M. Pereira, I. Boerasu, M.J. M. Gomez, B. Watts, and F. Leccabue

Formation of (Bi,La)₄Ti₃O₁₂ films on Si(100) substrates using LaAlO₃ buffer layers

Byung-Eun Park and Hiroshi Ishiwara

Dielectric and structural properties of PST films deposited by RF ion sputtering on LSCO/Si substrates

E. Martinez, A. Fundora, O. Blanco, and J.M. Siqueiros

Sol-gel preparation and characterization of Er doped PbTiO₃ thin films

Siakovlev, C.-H. Solterbeck, A. Piorra, N. Zhang, M. Es-Souni, and M. Avdeev

Optical properties of LiNbO₃ thin films

Sadi Yilmaz

Barium metaplumbate thin film electrodes for ferroelectric devices

A.I. Mardare, C.C. Mardare, E. Joanni, J.R.A. Fernandes, P.M. Vilharinho, and A.L. Kholkin

Ferroelectric relaxor thin films grown by pulsed laser deposition

P. Verardi, F. Craciun, N. Scarisoreanu, M. Dinescu, C. Grigoriu, C. Galassi, and A.L. Costa

Growth characterization of BaBi₂Nb₂O₉ thin films made by RF-magnetron sputtering

T. Mazon, E. Joanni, J.R.A. Fernandes, M.A. Zaghet, M. Cilense, and J.A. Varela

ECAPD-VI PAPERS

Ferroelectricity of sol-gel thin film multilayer heterostructures of modified PbTiO₃ onto Si-based substrates

R. Poyato, J. Ricote, M.L. Calzada, and L. Pardo

PIEZOELECTRICS AND PYROELECTRICS

Large strain ceramics based on electric field-induced phase transformation in Sr-modified PZT

Raj N. Singh

Piezoceramics from the solid solution SBN/BTN: Microstructure and electromechanical properties

A. Moure, J. Ricote, C. Alemany, and L. Pardo

Influence of internal mechanical losses on the fundamental frequencies of thickness extensional piezoelectric resonators

J.L. San Emeterio and A. Ramos

Processing, dielectric and piezoelectric properties of the PbTiO₃-based ceramics

E.D. Politova, A.S. Abdulova, G.M. Kaleva, A.V. Mosunov, and A.G. Segalla

Dielectric and pyroelectric response of PLZT-P(VDF/TrFE) nanocomposites

Bożena Hilczer, Jan Kulek, Ewa Markiewicz, and Marija Kosec

Modulation transfer function of a pyroelectric sensor array based on a finite element model

Günter Milde, Jörg Drescher, Gerald Gerlach, Herbert Balke, and Hans-Achim Bahr

Interferometric measurement of the

temperature dependence of piezoelectric coefficients for PZN-8% PT single crystals

M. Sulc, J. Erhart, and J. Nosek

Characterization techniques for porous piezoelectric materials

G. Fabbri, C. Galassi, and F. Craciun

Study of equivalent circuits of piezoceramics to use in simulations with Pspice

A. Guisado, J.L. Torres, and A.M. González

Dielectric properties of PZN-PT single crystals influenced by electric field in a wide temperature range

P. Hana, L. Burianova, E. Furman, and L.E. Cross

On the measurement of the electro-mechanical coupling coefficient k_t using different characteristic frequencies

J.L. San Emeterio, A. Ramos, and A. Ruiz

Pyroelectric technique for measurement of thermal diffusivity of thin solid materials

Supasarote Muensit and Sidney B. Lang

Development of a biosensor based on a piezoelectric film

P. Inácio, J.N. Marat-Mendes, and C.J. Dias

CERAMICS AND POLYMERS

Dielectric relaxation at ultra low frequency

E.R. Neagu, J.N. Marat-Mendes, and C.J. Dias

Design of new tunable ferroelectric composites

C. Huber, M. Treguer-Delapierre, C. Elissalde, F. Weill, and M. Maglione

Dielectric anomalies in La modified PbTiO₃ ferroelectric ceramics in the microwave frequency region

J. De Los Santos Guerra and J.A. Eiras

Temperature evolution of the relaxation spectrum in P(VDF/TrFE) copolymer

C. Filipic, B. Vodopivec, Z. Kutnjak, A. Levstik, and B. Hilczer

Structure and properties of Pb(LuNb)O₃-PbTiO₃ ceramics and thin films

A. Sternberg, L. Shebanovs, V. Zauls, K. Kundzins, M. Antonova, M. Livins, L. Cakare, M. Tyunina, J. Levoska, and I. Aulika

Raman spectroscopy and pyroelectric studies of SrTiO₃ ceramics doped with different concentrations of bismuth

A. Almeida, Pedri Teles, M.R. Chaves, P.M. Vilarinho, and J.L. Baptista

Mechanical characterization and influence of the high temperature shrinkage of β -PVDF films on its electromechanical properties

V. Sencadas, R. Barbosa, J.F. Mano, and S. Lanceros-Méndez

Chain reorientation of β -PVDF films upon transverse mechanical deformation studied by SEM and dielectric relaxation

ECAPD-VI PAPERS

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Eu-doped PT-type ceramics. I. Preparation and structural investigation

E. Dimitriu, E.D. Ion, S. Constantinescu, M. Bunesu, and R. Ramer

Anomalous apparent conductivity of PVDF and PT:P(VDF-TrFE) composites

S.N. Fedosov, A.E. Sergeeva, and J.N. Marat-Mendes

Dielectric and thermal study of the influence of aerosols on the ferroelectric SmA-Sm* phase transition

Z. Kutnjak, G. Cordoyiannis, and G. Nounesis

Space charge and dipolar contributions from amorphous and crystalline phases in ferroelectric polymers

R.M. Neagu, J.N. Marat-Mendes, E.R. Neagu, and P. Pissis

The study of electrical conductivity of cork

J.N. Marat-Mendes and E.R. Neagu

Submillimeter and far infrared dielectric response of Bi-doped SrTiO₃ ceramics

Alexej Pashkin, Polina Samoukhina, Tetyana Ostapchuk, Petr Kuzel, Paula Vilarinho, and Jan Petzelt

Effects of two kinds of FeNbO₄ precursors in the obtainment and dielectric properties of PFN ceramics

O. Raymond, R. Font, N. Suárez,

J. Portelles, and J.M. Siqueiros

Synthesis and study of some new coordination polymers Mn(II) with semiconductor properties

I. Rosca, L. Oprea, D. Sutiman, A. Cailean, E. Neagu, M. Vizitiu, D. Sibiescu, and G. Apostolescu

Processing and dielectric properties of La(Mg_{0.5}Ti_{0.5})O₃-BaTiO₃ ceramics

M.P. Seabra, A.N. Salak, V.M. Ferreira, L.G. Vieira, and J.L. Ribeiro

Studies of new order-disorder structural transitions in Ln₂M₂O₇ (Ln = Lu, Gd; M = Ti)

A.V. Shlyakhtina, L.G. Shcherbakova, and A.V. Knotko

Dielectric relaxation and conformational disorder in P(VDF/TrFE)(50/50) copolymer films irradiated with fast electrons

Hilary Smogór, Bożena Hilczer, Czesław Pawlacyk, Janina Goslar, and Stanisław Warchol

Dielectric behavior of PLZT x/80/20 ferroelectric ceramics

Oscar García, Aime Peláis, Francisco Calderón, and Harvey Amorín

Synthesis and characterization of SrBi₂Ta₂O₉ powders for ferroelectric applications

G. González Aguilar and M.E.V. Costa

Raman studies of the FE-AFE phase transition in ceramic Li_{0.12}Na_{0.88}Ta_{0.2}Nb_{0.8}O₃ solid solution

N.V. Sidorov, M.N. Palatnikov, N.A. Golubniatnik, K. Bormanis,

A. Kholkin, and A. Sternberg

Dielectric permittivity and Cr¹³⁺ impurity luminescence of Sr_{0.99}Mg_{0.01}TiO₃ and SrTi_{0.99}Mg_{0.01}O₃

V.A. Trepakov, M.E. Savinov, I.B. Kudyk, A. Pashkin, S.E. Kapphan, P.M. Vilarinho, A. Tkach, A.L. Kholkin, and L. Jastrabik

SINGLE CRYSTALS

Halogenoantimonates (III) and halogenobismuthates (III)—A rich family of ferroelectric crystals

R. Jakubas, G. Bator, and Z. Ciunik

Dielectric and spectroscopic studies of betaine phosphate-betaine arsenate mixed system

A. Almeida, S. Sarmento, J.L. Ribeiro, L.G. Vieira, M.R. Chaves, and A. Klöpperpieper

Ultrasonic and piezoelectric investigation of Sn₂P₂S₆ type photosensitive ferroelectric semiconductor crystals

V. Samulionis, Yu. Vysochanskii, and V. Cajipe

Dielectric and infrared response of Ba_{0.77}Ca_{0.23}TiO₃

M.E. Savinov, V.A. Trepakov, S. Kamba, S.E. Kapphan, J. Petzelt, R. Pankrath, I.L. Kislova, A.B. Kutsenko, and L. Jastrabik

(Bi)polaron dynamics in SrTiO₃, Sr_{1-x}Ca_xTiO₃, and K_{1-x}Li_xTaO₃ systems

A. Levstik, C. Filipic, V. Bobnar, and R. Pirc

Synthesis and characterization of a

ECAPD-VI PAPERS

salt of sodium with L-Malic acid: A new ferroelectric?

G. Arunmozhi, E. De Matos Gomes, M. Belsley, A. Criado, S. Perez-Garrido, and F. Proença

Electron emission of ferroelectrics
A.A. Sidorkin, V.A. Sidorkin, O.V. Rogazinskaya, and S.D. Milovidova

Cation distribution and melting behavior of $\text{La}_3\text{Ga}_5\text{M}^{4+}\text{O}_{14}$ ($\text{M} = \text{Si, Ti, Ge, Zr, Sn, and Hf}$) crystals
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G. Bator and M. Wojtas

Dielectric properties of L-asparagine doped TGS (ASP-TGS) crystals
G. Arunmozhi, E. De Matos Gomes, and J.L. Ribeiro

Modification of the dielectric properties of TGS crystal grown under the influence of DC electric field with different strengths
G. Arunmozhi, E. De Matos Gomes, and J.L. Ribeiro

Association of impurities and vacancies in copper doped potassium tantalate crystals studied by EPR

A.G. Badalyan, P.G. Baranov, V.A. Trepakov, C.B. Azzone, P. Galinetto, M.C. Mozzati, L. Jastrabik, and J. Rosa

Domain structure, local hysteresis and ferroelectric phase transition in $(\text{CH}_3\text{NH}_3)_5\text{Bi}_2\text{Br}_{11}$ (MAPBBB)

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M. Wojtas, V.V. Shvartsman, R. Jakubas, and A. Kholkin

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Surface hexagonally poled lithium niobate waveguides

A.C. Busacca, C.L. Sones, R.W. Eason, S. Mailis, K. Gallo, R.T. Bratfalean, and N.G. Broderick

Self-focusing in pulsed and continuous regime in photorefractive crystals: KNbO_3 , LiNbO_3 , $\text{Sr}_x\text{Ba}_{1-x}\text{Nb}_2\text{O}_6$

C. Hesse, D. Wolfersberger, N. Fressengeas, and G. Kugel

Investigation of photorefractive SBN crystals with atomic force microscopy

E. Soergel, R. Pankrath, and K. Buse

Light scattering in some order-disorder type ferroelectrics due to phase transitions

Suleyman Yilmaz, Amirullah Mamedov, Halide Sahan, and Gulden Gunel

Optimization of nonvolatile two-color holographic recording in near-stoichiometric LiNbO_3

Mojca Jazbinsek, Marko Zgonik, Myeongkyu Lee, Shunji Takekawa, Kenji Kitamura, and Hideki Hatano

Experimental determination of the electrooptic coefficients in $\text{BaTiO}_3\text{:Rh}$ at 633 nm and 850 nm
A. Maillard, S. Bahsine, G. Kugel, D. Rytz, and R.S. Klein

Considerations of angular accep-

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R.S. Klein, G.E. Kugel, A. Maillard, and K. Polgar

Frequency behavior of dielectric constants of raw and reduced $\text{Li}_2\text{B}_4\text{O}_7$ (LTB)

A. Elbelrhiti Elalaoui, A. Maillard, and M.D. Fontana

Transient absorption of niobium states in photorefractive materials
L. Grigorjeva, D. Millers, and V. Pankratov

Optical neural network architecture in photoferroelectrics
Yunus Babur and Amirullah M. Mamedov

Surface domain inversion in ferroelectric lithium niobate
A.C. Busacca, C.L. Sones, R.W. Eason, and S. Mailis

Absolute effective nonlinear coefficient and angular acceptance measurements in LTB by second harmonic generation
A. Sifi, R.S. Klein, G.E. Kugel, A. Maillard, and K. Polgar

Observation of the light beam evolution in aa biased SBN crystal in pulsed and continuous regime
C. Hesse, D. Wolfersberger, N. Fressengeas, and G. Kugel

Electret states in some electrooptical materials
Suleyman Cabuk and Amirullah M. Mamedov

Electrooptical properties of LiTaO_3
M. Zeki Kurt

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Normal and relaxor behavior of ferroelectric P(VDF-TrFE) copolymers

C. Welter, L.O. Faria, and R.L. Moreira

Ferroelectric domain dynamics in PMN-Pt ceramics

M.H. Lente, A.L. Zanin, S.B. Assis, I.A. Santos, D. Garzia, and J.A. Eiras

Charge localization in the model of relaxor ferroelectrics

R.F. Mamin, S.A. Migachev, S.I. Nikitin, M.F. Sadykov, and D.G. Zverev

Diffuse phase transition in lead containing relaxor ferroelectrics: Bias field effects

K. Bormanis, S.A. Satarov, A. Kalvane, A. Sternberg, A.I. Burkhanov, and A.V. Shil'nikov

Anion-deficient perovskite $\text{Pb}(\text{Mg}_{0.5}\text{Nb}_{0.5})\text{O}_{2.75}$ ceramics obtained under high pressure

A.N. Salak, N.P. Vyshatko, V.M. Ferreira, Yu.V. Radyush, and N.M. Olekhnovich

Relaxor behavior of $\text{BaBi}_2\text{Ta}_2\text{O}_9$ and $\text{BaBi}_2\text{Nb}_2\text{O}_9$ ceramics

V.V. Shvartsman, M.E.V. Costa, M. Avdeev, and A.L. Kholkin

NANOSCALE EFFECTS AND THEORY

Theory of the specific heat of relaxor ferroelectrics

R. Pirc, R. Blinc, and Z. Kutnjak

Polarization reversal in ferroelectrics: Stochastic analysis
E. Klotins

Polarization induced electronic processes in a quantum well
Amirullah M. Mamedov, Faruk Karadag, Suleyman Gungor, Selami Palaz, and Yunus Colak

Microstructure and local piezoelectric properties of $(\text{Pb,Ca})\text{TiO}_3$ thin films

V.V. Shvartsman, M.L. Calzada, R. Poyato, L. Pardo, and A.L. Kholkin

Spatio-temporal correlations of local polarization in ferroelectrics

J. Kaupuzs and E. Klotins

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Ferroelectricity Newsletter

including all back issues is available on Internet

<http://www.sp.nps.navy.mil/projects/ferro/ferro.html>

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UPCOMING MEETINGS

UK Ferroelectric Materials Network Conference**14 - 15 June 2004****Cranfield Management Development Centre, Cranfield University, UK**

Cranfield University is pleased to be hosting the UK Ferroelectric Materials Network Annual Conference on 14 and 15 June 2004. Ferroelectric materials are used in a huge range of electronic devices with a world market of tens of billions of dollars per annum. Applications include piezoelectric devices (transducers, sensors, filters, etc.), microwave communications filters, uncooled infrared detectors and imagers, display and other optical devices, memories, and the rapidly growing field of micro-electro-mechanical devices (MEMS). The UK has taken a leading role in the development of many of these and the aim of this conference, which is the fourth in the series, is to provide a platform for displaying the UK's materials research and device developments in this exciting field and a workshop for discussing the direction of the materials' developments.

Topics

- Materials processing
- Materials characterization
- Structure of ferroelectric materials and the relation of structure to properties
- Piezoelectric materials and devices (sound generation/detection, "smart" materials, etc)
- RF materials and devices (SAW, FBAR, resonators, filters, etc)
- Pyroelectric materials and devices
- Electrooptic materials and devices
- Microwave dielectrics and filter devices
- Capacitor dielectrics
- Display applications
- Ferroelectric thin films
- MEMS applications
- Nanoscale effects

Contact www.nanotek.org/ferroelectricsuk**American Chemical Society Short Courses
for Polymer Scientists and Engineers****Frontiers in Inorganic Polymers**

4 - 5 November 2004, Philadelphia, PA

Introduction to Polymeric Adhesives and Composites

17 - 22 October 2004, Virginia Tech, Blacksburg, VA

Introduction to Polymers in Medicine

8 - 11 June 2004, Virginia Commonwealth University, Richmond, VA

Polymer Characterization: Thermal, Mechanical, Structural

1 - 6 August 2004, Virginia Tech, Blacksburg, VA

Polymer Chemistry: Principles and Practice

15 - 20 August 2004 and 5 - 10 December 2004, Virginia Tech, Blacksburg, VA

Contact <http://chemistry.org/shortcourses>

UPCOMING MEETINGS

7th European Conference on Applications of Polar Dielectrics (ECAPD7)

6 - 9 September 2004

Liberec, Czech Republic

The European Conference on Applications of Polar Dielectrics (ECAPD) is the major European and international forum to present and discuss recent advancements in the area of polar dielectric materials: basic research, device-oriented research and technology development.

Topics

Materials research of dielectrics

- Single crystals
- Thin films
- Ceramics
- Polymers
- Composites and liquid crystals
- Processing and fabrication technologies

Basic research on application-oriented physical properties of dielectrics

- Ferro-, piezo-, and pyroelectric properties
- Electrooptical and nonlinear effects
- Photorefractivity and photoconductivity
- Ultrasonics
- High T_c superconductivity
- Ionic conductivity
- Microstructure related properties
- Domain engineering

Device research

- Piezoelectric transducers
- Smart sensors and actuators
- Pyroelectric detectors
- Electrooptic modulators and displays
- 2D and 3D optical storage devices
- Optical signal processors
- Optical frequency converters
- Periodically poled ferroelectric devices
- Ferroelectric memories and integrated optical devices
- Microelectromechanical systems

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UPCOMING MEETINGS

A. Bell, University of Leeds (UK)
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M. Fontana, University of Metz (France)
J. Fousek, Technical University of Liberec (Czech Republic)
P. Günter, ETHZ (Switzerland)
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J. Petzelt, Institute of Physics AS, Czech Republic

Important Dates

Abstract submission deadline	5 April 2004
Notice of acceptance	15 May 2004
Early registration	15 June 2004
Preliminary program	15 July 2004
Manuscript due	6 September 2004

Contact and Secretariat

<http://www.mechatronika.cz/ECAPD7/>

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Winter 2004

Ferroelectricity Newsletter

CALENDAR OF EVENTS 2004

- | | |
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| Jun 14-15 | • UK Ferroelectric Materials Network Conference, Cranfield, UK (see <i>Ferroelectricity Newsletter</i> , Vol. 12, No. 1, p. 13) |
| Aug 1-6 | • Polymer Characterization: Thermal, Mechanical, Structural, ACS short course, Blacksburg, Virginia, USA (see <i>Ferroelectricity Newsletter</i> , Vol. 12, No. 1, p. 13) |
| Aug 15-20 | • Polymer Chemistry: Principles and Practice, ACS short course, Blacksburg, Virginia, USA (see <i>Ferroelectricity Newsletter</i> , Vol. 12, No. 1, p. 13) |
| Sep 6-9 | • 7th European Conference on Applications of Polar Dielectrics (ECAPD7), Liberec, Czech Republic (see <i>Ferroelectricity Newsletter</i> , Vol. 12, No. 1, p. 14) |
| Oct 17-22 | • Introduction to Polymeric Adhesives and Composites, ACS short course, Blacksburg, Virginia, USA (see <i>Ferroelectricity Newsletter</i> , Vol. 12, No. 1, p.13) |
| Nov 4-5 | • Frontiers in Inorganic Polymers, ACS short course, Philadelphia, Pennsylvania, USA (see <i>Ferroelectricity Newsletter</i> , Vol. 12, No. 1, p.13) |
| Nov 29-
Dec 3 | • 2004 MRS Fall Meeting, Boston, Massachusetts, Info: www.mrs.org/meetings/fall2004/ |
| Dec 5-10 | • Polymer Chemistry: Principles and Practice, ACS short course, Blacksburg, Virginia, USA (see <i>Ferroelectricity Newsletter</i> , Vol. 12, No. 1, p. 13) |